

simultaneous iteration, and the QR algorithm. 6.3. Eigenvalues of large, sparse matrices, I. 6.4. Eigenvalues of large, sparse matrices, II. 6.5. Sensitivity of eigenvalues and eigenvectors. 6.6. Methods for the symmetric eigenvalue problem. 6.7. The generalized eigenvalue problem. 7. Iterative methods for linear systems. 7.1. A model problem. 7.2. The classical iterative methods. 7.3. Convergence of iterative methods. 7.4. Descent methods; Steepest descent. 7.5. Preconditioners. 7.6. The conjugate-gradient method. 7.7. Derivation of the CG algorithm. 7.8. Convergence of the CG algorithm. 7.9. Indefinite and nonsymmetric problems. Appendix. Some sources of software for matrix computations. References. Index. Index of MATLAB terms.

*Quantum Calculus*. By Victor Kac and Pokman Cheung. Springer, New York. (2002). 112 pages. \$29.95.

Contents:

Introduction. 1.  $q$ -derivative and  $h$ -derivative. 2. Generalized Taylor's formula for polynomials. 3.  $q$ -analogue of  $(x - a)^n$ ,  $n$  an integer, and  $q$ -derivatives for binomials. 4.  $q$ -Taylor's formula for polynomials. 5. Gauss's binomial formula and a noncommunicative binomial formula. 6. Properties of  $q$ -binomial coefficients. 7.  $q$ -binomial coefficients and linear algebra over finite fields. 8.  $q$ -Taylor's formula for formal power series and Heine's binomial formula. 9. Two Euler's identities and two  $q$ -exponential functions. 10.  $q$ -trigonometric functions. 11. Jacobi's triple product identity. 12. Classical partition function and Euler's product formula. 13.  $q$ -hypergeometric functions and Heine's formula. 14. More on Heine's formula and the general binomial. 15. Ramanujan product formula. 16. Explicit formulas for sums of two and four squares. 17. Explicit formulas for sums of two and of four triangular numbers. 18.  $q$ -antiderivative. 19. Jackson integral. 20. Fundamental theorem of  $q$ -calculus and integration by parts. 21.  $q$ -gamma and  $q$ -beta functions. 22.  $h$ -derivative and  $h$ -integral. 23. Bernoulli polynomials and Bernoulli numbers. 24. Sums of powers. 25. Euler-Maclaurin formula. 26. Symmetric quantum calculus. Appendix: A list of  $q$ -antiderivatives. Literature. Index.

*SPSS in Practice: An Illustrated Guide*. By Basant K. Puri. Arnold, London. (2002). 175 pages. \$29.95.

Contents:

Preface to the first edition. 1. Introduction. 2. Data entry. 3. Choosing a statistical test. 4. Exploring data and editing graphical output. 5. Data transformation and selection. 6. Comparing two sample averages. 7. Contingency tables. 8. Analysis of variance. 9. Statistical association. 10. Linear regression between two variables. Appendix. Index.

*Fractals, Graphics, & Mathematics Education*. Edited by Michael L. Frame & Benoit B. Mandelbrot. The Mathematical Association of America, Washington, D.C. (2002). 206 pages. \$39.95.

Contents:

Foreword (L.A. Steen). Preface. Introductory Essays. 1. Some reasons for the effectiveness of fractals in mathematics education (B.B. Mandelbrot and M. Frame). 2. Unsolved problems and still-emerging concepts in fractal geometry (B.B. Mandelbrot). 3. Fractals, graphics, and mathematics education (B.B. Mandelbrot). 4. Mathematics and society in the 20<sup>th</sup> century (B.B. Mandelbrot). Classroom experiences. 5. Teaching fractals and dynamical systems at the Hotchkiss School (M. Brakalova and D. Coughlin). 6. Reflecting on Wada basins: Some fractals with a twist (D. Camp). 7. Learning and teaching about fractals (D.M. Davis). 8. The fractal geometry of the Mandelbrot set: Periods of the bulbs (R.L. Devaney). 9. Fractals—Energizing the mathematics classroom (V. Fegers and M.B. Johnson). 10. Other chaos games (S. Fillebrown). 11. Creating and teaching undergraduate courses and seminars in fractal geometry: A personal experience (M. Lapidus). 12. Exploring fractal dimensions by experiment (R. Lewis). 13. Fractal themes at every level (K.G. Monks). 14. Art and fractals: Artistic explorations of natural self-similarity (B. Murratti and M. Frame). 15. Order and chaos, art and magic: A first college course in quantitative reasoning based on fractals and chaos (D. Peak and M. Frame). 16. A software driven undergraduate fractals course (D.C. Ravenel). A final word. 17. The fractal ring from art to art through mathematics, finance, and the sciences (B.B. Mandelbrot). Appendices. 18. Panorama of fractals and their uses. An alphabetic workbook-index (M. Frame and B.B. Mandelbrot). 19. Reports of some field experiences. Guide to topics. References. About the editors and other contributors. Index.

*Computationalism: New Directions*. Edited by Matthias Scheutz. The MIT Press, Cambridge, MA. (2002). 209 pages. \$35.

Contents:

Authors. Preface. 1. Computationalism—The next generation (M. Scheutz). 2. The foundations of computing (B.C. Smith). 3. Narrow versus wide mechanism (B.J. Copeland). 4. The irrelevance of Turing machines to artificial intelligence (A. Sloman). 5. The practical logic of computer work (P.E. Agre). 6. Symbol grounding and the original of language (S. Harnad). 7. Authentic intentionality (J. Haugeland). Epilogue. References. Index.

*Pricing the Priceless: A Health Care Conundrum*. By Joseph P. Newhouse. The MIT Press, Cambridge, MA. (2002). 258 pages. \$35.

Contents:

Preface and acknowledgments. Introduction. 1. Fee-for-service medicine and its discontents. 2. The integration of medical insurance and medical care. 3. The management of moral hazard and stinting: Demand- and supply-

side prices. 4. Selection and demand side. 5. Selection and supply side. 6. Risk adjustment, market equilibrium, and carveouts: Pulling a rabbit out of a hat? Notes. References. Index.

*Calendrical Tabulations*. By Edward M. Reingold and Nachum Dershowitz. Cambridge University Press, New York. (2002). 606 pages. \$120.

Contents:

Preface. Reading the tables. References. Calendars, 1900–2200. Warnings.

*Population Viability Analysis*. Edited by Steven R. Beissinger and Dale R. McCullough. The University of Chicago Press, Chicago. (2002). 577 pages. \$35.

Contents:

Foreword (M.E. Soulé). Editors' preface. Part I. Overview of population viability analysis. 1. Population viability analysis: Past, present, future (S.R. Beissinger). 2. Incorporating stochasticity in population viability analysis (R. Lande). 3. Reconciling the small-population and declining-population paradigms (M.S. Boyce). 4. The role of genetics in population viability analysis (F.W. Allendorf and N. Ryman). 5. Metapopulations of animals in highly fragmented landscapes and population analysis (I. Hanksi). 6. Plant population viability and metapopulation-level processes (S. Harrison and C. Ray). 7. Population viability analysis and conservation policy (M. Shaffer, L. Hood Watchman, W.J. Snape III, and I.K. Latchis). Part II. Issues in the parameterization and construction of PVA models. 8. Definition and estimation of effective population size in the conservation of endangered species (R.S. Waples). 9. Estimating parameters of PVA models from data on marked animals (G.C. White, A.B. Franklin, and T.M. Shenk). 10. Including uncertainties in population viability analysis using population prediction intervals (B.-E. Sæther and S. Engen). 11. Bayesian population viability analysis (P.R. Wade). 12. Incorporating uncertainty in population viability analyses for the purpose of classifying species by risk (B.L. Taylor, P.R. Wade, U. Ramakrishnan, M. Gilpin, and H. Resit Akçakaya). Part III. Integrating theory and practice in the use of population viability analysis. 13. How good are PVA models? Testing their predictions with experimental data on the brine shrimp (G.E. Belovsky, C. Mellison, C. Larson, and P.A. Van Zandt). 14. Evolution of population viability assessments for the Florida panther: A multiperspective approach (D.S. Maehr, R.C. Lacy, E.D. Land, O.L. Bass, Jr., and T.S. Hockett). 15. Population viability analysis for plants: Understanding the demographic consequences of seed banks for population health (D.F. Doak, D. Thomson, and E.S. Jules). 16. Sensitivity analysis to evaluate the consequences of conservation actions (L.S. Mills and M.S. Lindberg). 17. Application of molecular genetics to conservation: New issues and examples (P.W. Hedrick). 18. Pedigree analyses in world populations (S.M. Haig and J.D. Ballou). 19. Rangewide risks to large populations: The Cape Sable sparrow as a case history (S.L. Pimm and O.L. Bass, Jr.). 20. Population viability analysis, management, and conservation planning at large scales (F.B. Samson). Part IV. The future of population viability analysis. 21. Predictive Bayesian population viability analysis: A logic for listing criteria, delisting criteria, and recovery plans (D. Goodman). 22. Decision theory for population viability analysis (H.P. Possingham, D.B. Lindenmayer, and G.N. Tuck). 23. Incorporating human populations and activities into population viability analysis (R.C. Lacy and P.S. Miller). 24. Fitting population viability analysis into adaptive management (D. Ludwig and C.J. Walters). 25. Guidelines for using population viability analysis in endangered-species management (K. Ralls, S.R. Beissinger, and J. Fitts Cochrane). About the contributors. Index.

*Mathematical Principles of Signal Processing: Fourier and Wavelet Analysis*. By Pierre Bocré Maud. Springer, New York. (2002). 269 pages. \$79.95.

Contents:

Preface. A. Fourier analysis in  $L^1$ . Introduction. A1. Fourier transforms of stable signals. A1.1. Fourier transform in  $L^1$ . A1.2. Inversion formula. A2. Fourier series of locally stable periodic signals. A2.1. Fourier series in  $L^1_{loc}$ . A2.2. Inversion formula. A3. Pointwise convergence of Fourier series. A3.1. Dini's and Jordan's theorems. A3.2. Féjer's theorem. A3.3. The Poisson formula. References. B. Signal processing. Introduction. B1. Filtering. B1.1. Impulse response and frequency response. B1.2. Band-pass signals. B2. Sampling. B2.1. Reconstruction and aliasing. B2.2. Another approach to sampling. B2.3. Intersymbol interference. B2.4. The Dirac formalism. B3. Digital signal processing. B3.1. The DFT and the FFT algorithm. B3.2. The Z-transform. B3.3. All-pass and spectral factorization. B4. Subband coding. B4.1. Band splitting with perfect reconstruction. B4.2. FIR subband filters. References. C. Fourier analysis in  $L^2$ . Introduction. C1. Hilbert spaces. C1.1. Basic definitions. C1.2. Continuity properties. C1.3. Projection theorem. C2. Complete orthonormal systems. C2.1. Orthonormal expansions. C2.2. Two important Hilbert bases. C3. Fourier transforms of finite-energy signals. C3.1. Fourier transform in  $L^2$ . C3.2. Inversion formula in  $L^2$ . C4. Fourier series of finite-power periodic signals. C4.1. Fourier series in  $L^2_{loc}$ . C4.2. Orthonormal systems of shifted functions. References. D. Wavelet analysis. Introduction. D1. The windowed Fourier transform. D1.1. The uncertainty principle. D1.2. The WFT and Gabor's inversion formula. D2. The wavelet transform. D2.1. Time-frequency resolution of wavelet transforms. D2.2. The wavelet inversion formula. D3. Wavelet orthonormal expansions. D3.1. Mother wavelet. D3.2. Mother wavelet in the Fourier domain. D3.3. Mallat's algorithm. D4. Construction of an MRA. D4.1. MRA from an orthonormal system. D4.2. MRA from a Riesz basis. D4.3. Spline wavelets. D5. Smooth multiresolution analysis. D5.1. Autoreproducing property of the resolution spaces. D5.2. Pointwise convergence theorem. D5.3. Regularity properties of wavelet bases. References. Appendix. The Lebesgue integral. References. Glossary of symbols. Index.